

Having thus described the invention, it is claimed:

1. A method of producing an aqueous solution of thermodynamically free iodine from iodine vapor transferred across a membrane from an iodine source, comprising the following steps:

5 selecting a membrane that is permeable to iodine and water vapor but impermeable to liquids and solids;

providing a source of iodine vapor;

providing such membrane in the form of an enclosure to contain the source of iodine vapor;

10 providing a vessel that contains a receiving medium for the iodine vapor;

and

permeating iodine vapor across the membrane.

2. The method of claim 1 wherein the iodine source is iodine as an iodine-releasing solid or an iodine-releasing liquid that contains iodine in solution or in a complex form.

3. The method of claim 2 including the additional steps of:

absorbing the iodine vapor in the liquid contained in the vessel;

mixing the iodine vapor with inert gas contained in or flowing through the vessel; and

5 controlling flow of the receiving medium such that it is either static or moving.

4. The method of claim 3 including the additional step of: passing the inert gas containing iodine vapor through a liquid medium that absorbs said iodine vapor.
5. The method of claim 1 wherein the iodine vapor-permeable membrane is an organic plastic material.
6. The method of claim 1 wherein the iodine vapor-permeable membrane is an inorganic material.
7. The method of claim 1 wherein the iodine vapor-permeable membrane is single ply.
8. The method of claim 1 wherein the iodine vapor-permeable membrane is multi-ply construction wherein the plies are of the same or different composition and structure.
9. The method of claim 1 wherein the iodine vapor-permeable membrane is a continuous film.
10. The method of claim 1 wherein the iodine vapor-permeable membrane is non-woven.

11. The method of claim 1 wherein the iodine vapor-permeable membrane is a nanostructure.
12. The method of claim 1 wherein the iodine vapor-permeable membrane is perforated.
13. The method of claim 1 wherein the membrane material is substantially non-permeable to solid iodine.
14. The method of claim 13, including the additional step of, transferring iodine vapor through discrete pores in the membrane of less than 5 microns.
15. The method of claim 1, including the additional steps of:
5 providing a vessel of a material that is substantially impermeable to iodine vapor and essentially unreactive towards iodine;
maintaining a temperature of the receiving medium in the range of about -10 to 110 degrees Centigrade;
maintaining a pressure in the vessel containing the receiving medium in a range from vacuum to about 5 atmospheres; and
constructing and testing the vessel for the specified pressure rating.
16. A device for producing a saturated or concentrated solution of iodine, comprising:

an iodine vapor-permeable membrane sealed by a melt sealer or adhesive means into a sachet or pouch;

5 an iodine source contained within said sachet or pouch;

an iodine-receiving medium;

a vessel containing the iodine-receiving medium;

a suitable means for providing controlled flow, where desired, of the iodine-receiving medium;

10 a suitable means of supplying agitation of the receiving medium;

a suitable means of heating or cooling and temperature control of the receiving medium, where required for the intended end-use;

a suitable means for controlling the pressure in the receiving medium, where required for the intended end-use; and

15 a suitable means for removing a measured volume of iodine solution from the vessel in batch or continuous mode.

17. The device of claim 16 wherein the iodine vapor-permeable membrane is an inorganic material.

18. The device of claim 16 wherein the iodine vapor-permeable membrane is single ply.

19. The device of claim 16 wherein the iodine vapor-permeable membrane is multi-ply construction wherein the plies are the same or different composition and structure.

20. The device of claim 16 wherein the iodine vapor-permeable membrane is a continuous film.

21. The device of claim 16 wherein the iodine vapor-permeable membrane is non-woven.

22. The device of claim 16 wherein the iodine vapor-permeable membrane is a nanostructure.

23. The device of claim 16 wherein the iodine vapor-permeable membrane is perforated.

24. The device of claim 16 wherein the membrane material is substantially non-permeable to solid iodine.

25. The device of claim 16 that can produce controlled or blended iodine solutions of any strength up to the saturation level.

26. A method of preparing an iodine fluid for dietary purposes directly or by blending, comprising the steps of:

selecting a membrane that is permeable to iodine and water vapor but impermeable to liquids and solids;

5 providing such membrane in the form of an enclosure to contain the source of iodine vapor;

providing a source of iodine vapor within the enclosure;

providing a vessel that contains a receiving medium for the iodine vapor;

controlling a flow of the iodine-receiving medium in the vessel;

10 removing a measured volume of iodine solution from the vessel in a batch or continuous mode; and

preparing an iodine fluid for dietary purposes.

27. A method of preparing a fluid for disinfecting, sterilizing and preserving food ingredients, food stuffs, feed ingredients and feedstuffs, comprising the steps of:

5 selecting a membrane that is permeable to iodine and water vapor but impermeable to liquids and solids;

providing such membrane in the form of an enclosure to contain the source of iodine vapor;

providing a source of iodine vapor within the enclosure;

providing a vessel that contains a receiving medium for the iodine vapor;

10 removing a measured volume of iodine solution from the vessel in a batch or continuous mode; and

preparing a fluid for disinfecting, sterilizing and preserving food ingredients, food stuffs, feed ingredients and feedstuffs.

28. A method for preserving food products such as fish, seafood, poultry and meat, according to the steps of:

producing ice from an aqueous iodine solution prepared according to the steps of:

- 5 selecting a membrane that is permeable to iodine and water vapor but impermeable to liquids and solids;
- providing such membrane in the form of an enclosure to contain the source of iodine vapor;
- providing a source of iodine vapor within the enclosure; and
- 10 providing a vessel that contains a receiving medium for the iodine vapor.

29. A method for preserving food products such as fruits and vegetables, comprising the steps of:

spraying a dilute aqueous iodine solution prepared according to the steps of:

- 5 selecting a membrane that is permeable to iodine and water vapor but impermeable to liquids and solids;
- providing such membrane in the form of an enclosure to contain the source of iodine vapor;
- providing a source of iodine vapor within the enclosure; and
- providing a vessel that contains a receiving medium for the iodine vapor.

30. A method for producing an aqueous solution of a halogen or mixture of halogens, comprising the steps of:

selecting a membrane that is permeable to halogen and water vapor but impermeable to liquids and solids;

5 providing such membrane in the form of an enclosure to contain the source of halogen vapor;

providing a source of halogen vapor within the enclosure; and

providing a vessel that contains a receiving medium for the halogen vapor.

31. The method of claim 30 including the additional steps of:

absorbing the halogen vapor in the liquid contained in the vessel;

mixing the halogen vapor with inert gas contained in or flowing through the vessel; and

5 controlling flow of the receiving medium such that it is either static or moving.